giving a fluted character to the base of the wing. Many other peculiarities were noted in these evanescent toys, but they soon vanished.

But here is the chief wonder. There grew in the same situation some dozen or twenty small herbaceous plants of about the same general character which would all seem equally liable to exhibit such a phenomenon. There were species of Aster, Solidago, Chrysopsis, Pycnanthemum, Polygonum, Ludwigia, Sericocarpus, &c., and with these in considerable but not specially marked abundance, *Cunila Mariana.* The first frost-works seen were attached to this plant, which was supposed for a while to be an accident; but soon it was perceived that such was not the case, and an examination of hundreds of cases revealed the fact that they were exclusively confined to this species. No sign or semblance of them could be found on any other plant. They were, therefore, so far as observation went, a specific character, and it is this alone which prompted Mr. Ward to give the above account in the hope that others might be able to confirm or invalidate this induction by a wider one.

This plant persists after frost with all its branches, sere leaves, and empty seed vessels intact, so that its identity was as complete as in midsummer. The bark, which remained firm everywhere else, was seen to be longitudinally split into strips at the zone occupied by the frost-work, but as it could be seen between the several ice sheets, these rifts must have been covered by their bases. In other words, it cannot be doubted that the liquid matter out of which they were formed had passed through these longitudinal openings and been deposited by molecular accretions in the symmetrical forms observed. It was inferred from this that they might consist entirely of the juices of the plant, but on placing them on the tongue nothing distinguishable from pure distilled water could be detected. As the upper part of the stems was dead and dry and the roots perennial, the conclusion was that the water had by some agency been pressed or drawn up through the cambium layer of the roots from the soil and forced out through these apertures in the bark. The action of frost in the ground might account for the required pressure, and the whole would be thus explainable on physical principles. But it explains too much, since no reason can be assigned why the phenomenon should not be universal and not confined to a single species.

Since making these observations Mr. Ward has been to some pains to ascertain whether the phenomenon has been witnessed by others, but so far the inquiry has proved futile. It seems possible, therefore, that this is the first time that *Cunila Mariana* has been discovered to be a frost-weed. *Helianthemum Canadense*, however, behaves in a similar way. That plant is not common in the dittany and there has not been an opportunity to observe it at the proper season. The statement in the first edition of Gray's Manual, 1848, where the name "frost weed" is given to this species, that "late in autumn crystals of ice shoot from the cracked bark at the root, whence the popular name," repeated in all subsequent editions and copied into many other books, is doubtless founded on earlier recorded observations, but is not found in Nuttall or Pursh. A frost-figure also appears in Mr. Wm. Hamilton Gibson's recent book entitled "Sharp Eyes."[1] This figure is somewhat fanciful, being a vignette constituting the first letter of this chapter of his book and aiming to show all the parts of the plant in addition to the frost work. Although it is, according to this representation, a much less definite and less beautiful object than the dittany "frost-flowers," there can be no doubt that the principle on which it was formed is the same. The author's description of it as "fashioned into all sorts of whimsical feathery curls and flanges and ridges" indicates at once the inadequacy of his figure to do it justice, and the close analogy between it and the "frost flower" of Cunila.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

PROF. JEBB, M.P., in presenting the prizes and certificates on Tuesday to the students who successfully passed the last Cambridge local examination at Eastbourne centre, observed that thirty years ago examinations were believed to be a panacea for every educational defect. Now a reaction had set in, and some went so far as to hold that success in examinations afforded no trustworthy criterion of merit. The truth, of course, lay between these two extremes. An examination was not an infallible test, and was more favourable to some temperaments than to others; but, when well managed, was a sound test. An examiner must have at least three qualifications: he must know a great deal more than the subject in which he examined, or he would not have a proper sense of intellectual proportion and perspective; he must have a certain measure of acuteness to enable him to penetrate disguise or simulated knowledge; and, above all, he must have common sense in order to take proper account of particular circumstances of each case. The two older Universities, in the early part of the century, were said to be no longer in touch with the nation, and were regarded rather as great schools reserved for the education and, equally perhaps, the amusement of a select few; but now they had spread a network of examination, and were diffusing their influence over the country, becoming what they were in the Middle Ages, really national, but national in the higher sense, in the desire that every one who sought it should have the means of a liberal education, and that the best things which literature or science had to show should be placed within reach of all.

MR. ROBERT HOLT, late Assistant Lecturer in Engineering at University College, Liverpool, has been appointed Professor of Engineering at the People's Palace, London. Mr. Holt has held both Whitworth and National Scholarships, as well as one of the research scholarships founded by the Commissioners of the Exhibition of 1851.

AT a council meeting of the University College of Wales, Bangor, on June 21, a scheme for the supervision and residence of women students of the college next session was carried by a large majority.

LORD HERSCHEL has been appointed to succeed the late Earl of Derby as Chancellor of the University of London.

OXFORD has conferred the degree of D.C.L. upon Sir John B. Lawes, Bart., F.R.S.

SCIENTIFIC SERIAL.

Meteorologische Zeitschrift, May.—Rainfall probability and cloud in the United States, by W. Köppen. The author has submitted the rainfall charts published by the United States Government to a thorough investigation. The following are the generalised results as regards the distribution of rainfall:—(1) There is a district of continental summer rains, enclosed on both sides by littoral winter rains, which, corresponding to the contrast of the yearly oscillation of temperature, are much more marked in the west than in the east. (2) A district of isobaric summer rains, in the south-east, with equatorial sea-winds in summer, and with anticyclonic weather in winter. (3) Transition districts, in which both rainfall maxima occur near each other, while the minima occur in spring and autumn. Maxima after the equinoxes are nowhere very well marked, but the April and May rains of Colorado and Kansas and the autumn rains on Lake Superior are indications of them. With regard to the seasonal distribution in the tropical zone, the differences of temperature play only a small part compared to that of extra-tropical regions; this result naturally follows from the small variation of temperature in the tropics.—On the dynamics of the atmosphere, by M. Möller. This first part deals chiefly with the causes of the inversion of temperature with height, and with the cold experienced in the centres of areas of high barometric pressure. He deals especially with three causes of inversion:—The cooling of the lower strata by radiation, the effects on the higher strata by dynamic heating or cooling analogous to those caused by the action of Föhn winds, and the transference of warm air to the higher regions by horizontal winds coming from warmer parts. Various cases are separately considered from data afforded by mountain stations, such as Ben Nevis, and from discussions by Dr. Hann and others. Particular attention is also given to the formation and motions of clouds, as furnishing visible evidence of the processes in action in the higher strata of the atmosphere.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 8.—"Preliminary Report of the Joint Solar Eclipse Committee of the Royal Society, the Royal Astronomical Society, and the Solar Physics Committee on the

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[1] New York, 1892. Article "The Frost Flower," pp. 210, 211.

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Observations of the Solar Eclipse of April 16, 1893." Communicated by Dr. Common, F.R.S.

This report merely states the work undertaken by the British observers during the recent total solar eclipse, and the number and kind of photographs that were obtained. This information has appeared, from time to time, in these columns. A more detailed report, giving the results of the discussion of the pictures will shortly be published.

PARIS.

Academy of Sciences, June 12.—M. Lœwy in the chair.—Experimental verifications of the theory of weirs without lateral contraction, the sheet being free below, by M. J. Boussinesq.—On a simplification introduced into certain formulæ depending upon the resisting power of solids by introducing the greatest linear extension Δ which can be supported by the material, in the place of the corresponding elastic force R_0, by M. J. Boussinesq. In formulæ relating to the strength of elastic solids in motion, mechanicians as a rule introduce a quantity R_0 denoting the greatest tension which a fibre can sustain upon unit sectional area without breaking, instead of the maximum elongation Δ which does not endanger the texture. M. Boussinesq shows that many formulæ may be considerably simplified by introducing Δ. Thus the maximum velocity V which can be safely impressed upon an element of a solid under concussion is related to the velocity of sound in the solid and to Δ in a manner given by the formula $V = k\omega\Delta$, where k is a constant depending on the figure and mass of the solid, and ω is the velocity of sound in it. If V be the peripheral velocity of a flywheel in the form of a narrow ring with a large radius, the maximum safe velocity is given by the formula $V = \omega\sqrt{\Delta}$.—On various methods of observing the so-called anomalous focal properties of diffraction gratings, by M. A. Cornu.—On the extraction of zirconia and thorina, by M. L. Troost.—Study of some new phenomena of fusion and volatilisation produced by means of the heat of the electric arc, by M. Henri Moissan.—On Liouville's linear element surfaces, and surfaces with constant curvature, by M. Émile Waelsch.—On a general property of electric and magnetic fields, by M. Vaschy.—Study of the filtration of liquids, by M. R. Lezé. A porous vessel containing the liquid to be studied was placed in a test-tube and subjected to very rapid rotation. By a comparison of the weights of the porous vessel and its contents before and after rotation, the velocity of outflow through the porous walls due to centrifugal force was ascertained. Taking that of distilled water as unity, the figure for a five per cent. solution of sodium chloride was 1·023, for the nitrate 1·051, for ammonium sulphate 0·993. The velocity of efflux for alcohol solution showed a minimum at 40°, where it was 0·50. The numbers are those for a pressure of eight or ten atmospheres applied during ten minutes, during which the tubes travelled from 40 to 50 km.—On the combinations of molybdates and sulphurous acid, by M. E. Péchard.—On bromine-boracites; bromine compounds of iron and zinc, by MM. G. Rousseau and H. Allaire.—On fluorides of copper, by M. Poulenc.—Action of electricity upon the carburisation of iron by cementation, by M. Jules Garnier.—On the rotatory power of bodies belonging to an homologous series, by M. Ph. A. Guye. It is shown theoretically that if the schematic tetrahedron is slightly deformed, the rotatory powers of a homologous series of bodies must pass through a maximum.—On the rotatory powers of the ethers of valeric and glyceric acids, by MM. Ph. A. Guye and L. Chavanne. This paper contains experimental evidence supporting the conclusions of the previous paper.—Heat of formation of some derivatives of indigo, by M. R. d'Aladern.—On right-handed licareol, by M. Ph. Barbier.—A new apparatus for measuring the intensity of perfumes, by M. Eugène Mesnard. The instrument is based upon the property of essence of terebenthine of extinguishing the phosphorescence of phosphorus when mixed with the surrounding air in a certain minimum proportion. The phosphorescent body is a small piece of starch dipped into a concentrated solution of phosphorus in carbon bisulphide. After once determining the quantity of essence necessary to extinguish phosphorescence, the quantity of essence contained in air may be ascertained by passing sufficient of the air through the apparatus to produce extinction. This air is mixed with other air containing a known quantity of the essential oil or other perfume to be examined, and the odoriferous power of the latter is given by the quantity required to produce a "neutral" scent.—On the fertilisation of the Puccinicei, by M. Paul Vuillemin.—Magnesian chalk of the environs of Guise (Aisne), by M. H. Boursault.—On the cavern of Boundoulaou (Aveyron), by MM. E. A. Martel and Émile Rivière.—On the utilisation of the waste products of the vineyard, by M. A. Muntz.—Mode of action of the substances produced by microbes upon the circulatory apparatus, by MM. Charrin and Gley.—On a soluble derivative of β-naphthol, by MM. Dujardin-Beaumetz and Stackler.—On morbid intercurrencies in sulphate of quinine fevers, by M. Alcide Treille.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—Primitive Music: R. Wallaschek (Longmans).—Life with Trans-Siberian Savages: B. D. Howard (Longmans).—Nineteen Charts of the Isle of Wight and Solent Tides from Portland Bill to the Owers: T. B. C. West and F. H. Collins (Potter).—Photography Annual, 1893 (Iliffe).—Lehrbuch der Zoologie, new edition: Dr. R. Hertwig (Jena, Fischer).—Das Kleine Botanische Practicum für Anfänger, new edition: Dr. E. Strasburger (Jena, Fischer).—Die Pilzgärten einiger Sudamerikanischer Ameisen: A. Möller (Jena, Fischer).—Smithsonian Meteorological Tables (Washington).—On the Chemistry of the Blood: L. C. Wooldridge (K. Paul).—Walks in the Ardennes, new edition: edited by P. Lindley (London).—On English Lagoons: P. H. Emerson (Nutt).

PAMPHLETS.—The Condition of the Western Farmer: A. F. Bentley (Baltimore).—Report of the Trustees of the South African Museum, 1892 (Cape Town).—Il Terremoto a Roma del 22 Gennaio, 1892: Dr. G. Agamennone (Roma).—The Brighton Life Table: Dr. A. Newsholme (Brighton).—Die Medicinische Electrotechnik und ihre Physikalischen Grundlagen: Dr. J. L. Hoorweg (Leipzig, Engelmann).—Ueber das Norian oder Ober-Laurentian von Canada: F. D. Adams (Stuttgart, Koch).—Geometrical Constructions for Cutting from a Cone of Revolution: E. A. Engler (St. Louis).

SERIALS.—Proceedings of the Bath Natural History and Antiquarian Field Club, Vol. vii. No. 4 (Bath).—Journal of the Polynesian Society, Vol. 2, No. 1 (Wellington).—Bulletin of the New York Mathematical Society, Vol. 2, No. 9 (New York, Macmillan).—Journal de Physique, June (Paris). Séances de la Société Française de Physique, November-December, 1892 (Paris).—Proceedings of the American Philosophical Society, Vol. xxxi. No. 140 (Philadelphia).—Proceedings of the Academy of Natural Sciences of Philadelphia, 1893, Part 1, January-March (Philadelphia).—Bulletins de la Société d'Anthropologie, No. 5, June 15 (Paris, Masson).—Reale Instituto Lombardo di Scienze e Letture, Rendiconti, Serie 2, Vol. 26, fasc. xi.-xii. (Milano, Hoepli).—Phycological Memoirs: edited by G. Murray, Part 2 (Dulau).—Zeitschrift für Physikalische Chemie, xi. Band, 6 Heft (Leipzig, Engelmann).—The American Naturalist, June (Philadelphia).—Bulletin de la Société d'Encouragement pour l'Industrie Nationale, Avril (Paris).

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